VAA-Weekly-Progress

02/18-02/25

Context

- Using the same criteria, the top 10 antelope-similarity species generated by three different methods were trained and tested on RTMPose. The results were then compared with those of redistributed full Ap-10k.
- Continue working on keypoints definitions

Keypoint Comparison to AP10k

- Used the same reference images as in both definitions and overlaid the AP10k ground truth labels for a visual comparison
- Most noticeably different keypoints: Hip, Eyes, Nose
- AP10k tends to have similarities to both Visible and Biological (It doesn't appear to follow one distinct direction)
- In Box

Re-Calculating Species Similarity with DINOv2

Motivation: With the first run of DINOv2 species similarity evaluation there was concern it was mainly ranking species on color schemes similar to antelopes. Thus, we wanted to eliminate the effects of RGB colors on DINOv2 feature extraction.

Added Pre-Processing:

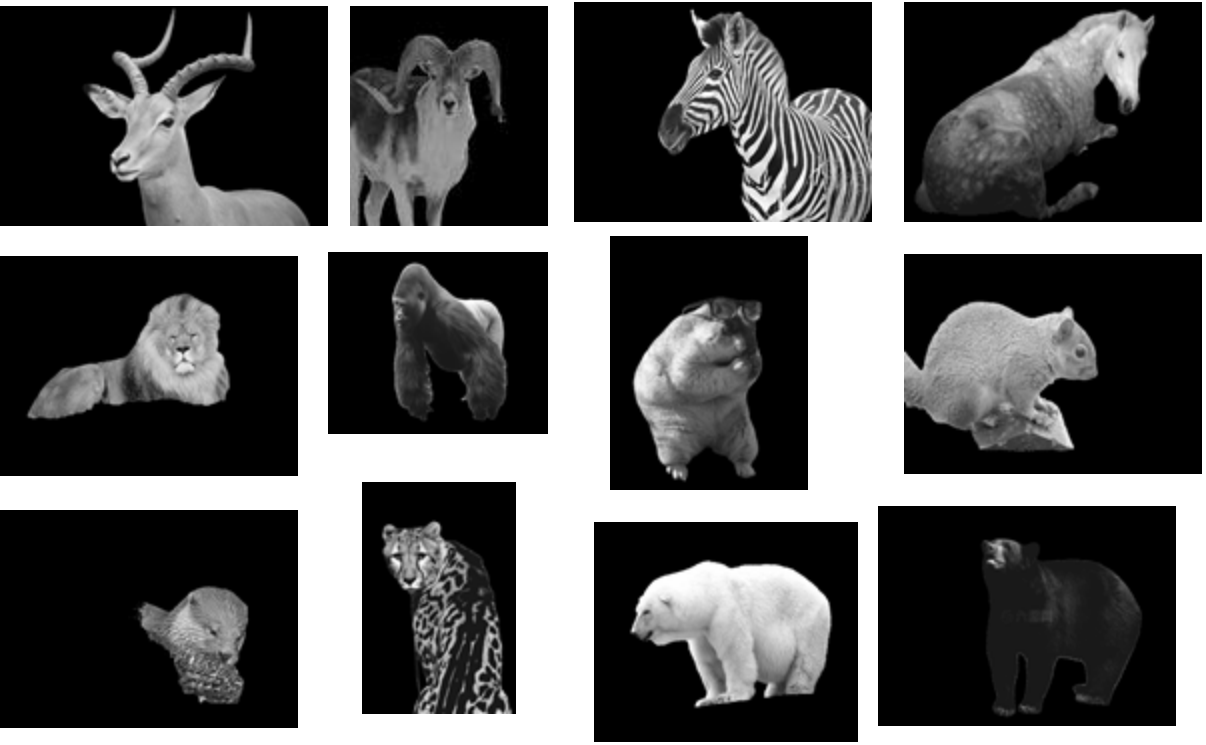
1. Gray-scale the image(values between [1-0.1] to differentiate with black background)
2. Detect animal in image(YOLOv8)
3. Use bounding box as input to SAMv2 model to generate a mask(on original image)
4. Apply mask to gray-scale image(black masked area)

Input gray-scale and mask image into DINOv2 model to generate features. Perform quantitative species similarity(same as previously).

VIP

PURDUE UNIVERSITY

Results of Image Pre-Processing

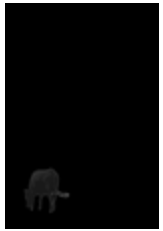


Failure Points:

Water:

Obstacles(Mess up Mask):

Black Animals:



Results of DINOv2 Species Similarity(with Pre-Processing)

1.deer: 0.9143

2.fox: 0.8846

3.weasel: 0.8696

4.dog: 0.8682

5.sheep: 0.8623

6.mouse: 0.8527

7.raccoon: 0.8515

8.squirrel: 0.8478

9.rabbit: 0.8469

10.cow: 0.8467

11.argali sheep: 0.8411

12.otter: 0.8368

13.moose: 0.8342

14.rat: 0.8330

15.polar bear: 0.8319

16.cheetah: 0.8316

17.wolf: 0.8291

18.giraffe: 0.8266

19.brown bear: 0.8263

20.bobcat: 0.8256

21.hamster: 0.8248

22.bison: 0.8229

23.horse: 0.8165

24.hippo: 0.8135

25.pig: 0.8079

26.monkey: 0.8025

27.snow leopard: 0.7994

28.cat: 0.7984

29.panda: 0.7966

30.skunk: 0.7964

31.spider monkey: 0.7917

32.beaver: 0.7910

33.rhino: 0.7849

34.buffalo: 0.7706

35.jaguar: 0.7653

36.noisy night monkey: 0.7581

37.elephant: 0.7534

38.lion: 0.7498

39.chimpanzee: 0.7374

40.leopard: 0.7368

41.tiger: 0.7304

42.marmot: 0.7178

43.alouatta: 0.6826

44.panther: 0.6680

45.zebra: 0.6624

46.black bear: 0.6265

47.king cheetah: 0.5896

48.gorilla: 0.4963

VIP

PURDUE UNIVERSITY

AP10k Baseline Redistribution

- We felt the need to adjust the AP10k dataset for our baseline comparison
- Originally, we trained and validated using AP10k's original data split (excluding antelopes), but did not use the testing data (Since we are testing all models on antelopes)
- Now, we redistribute the testing images to be included in training and validation, so all images that may be used in species-similarity trained models will also have been seen by the AP10k baseline

Species similarity training

- In order to compare all the species similarity measures, we thought it would be a good idea to downsize each dataset to the size of the smallest dataset between the 3 measures.
  - We subsetted the data from the redistributed ap-10k as well
- 1811 images; and 80:20 training:val split for all 3 metrics (1449 train 362 val)
- Also tested AP-10k redistributed just to view the impact of removing non similar species

Average Precision

	Full AP-10k redistributed	Top 10 Centroid	Top 10 Limb Ratios	Top 10 Dino No Pre-Processing	Top 10 Dino with Pre-Processing
coco/AP:	0.818	0.825	0.794	0.673	0.734
coco/AP .5:	0.969	0.978	0.957	0.917	0.973
coco/AP .75	0.884	0.883	0.873	0.723	0.802
coco/AP (M):	0.799	0.800	0.722	0.660	0.710
coco/AP (L):	0.817	0.823	0.794	0.675	0.736

Average Recall

	Full AP-10k redistributed	Top 10 Centroid	Top 10 Limb Ratios	Top 10 Dino No Pre-Processing	Top 10 Dino with Pre-Processing
coco/AP:	0.834	0.845	0.815	0.714	0.763
coco/AP .5:	0.975	0.980	0.960	0.934	0.975
coco/AP .75	0.892	0.897	0.882	0.766	0.829
coco/AP (M):	0.817	0.817	0.733	0.672	0.713
coco/AP (L):	0.834	0.846	0.818	0.715	0.764

Personal Progress

Medha

- Wrote Abstract rough draft
- Redistributed AP10k and trained RTMPose on the new redistributed data
- Created ground_truth.py to overlay keypoints on the images
- Wrote up keypoint comparison document

Parth

- Trained and tested top 10 centroid species on redistributed ap-10k data and downsized to same size as other similarity metrics
- Added edits to abstract
- Centralized centroid work to folders so it’s more organized

Claire

- Continued work on biological keypoints

Zian Pan

- Trained and tested top 10 limb ratio species on redistributed ap-10k data and downsized to same size to 1811 images.